ESTIMATING INDUSTRIAL NATURAL GAS PRICES

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The Energy Information Administration (EIA) collects and publishes data on prices and volumes of natural gas delivered to customers in four sectors (residential, commercial, industrial, and electric power). **EIA publishes the average price for a state computed as revenue averaged by volume**. Natural gas industry restructuring has resulted in industrial customers consuming less than 20 percent of the gas purchased from companies that physically deliver it to the facilities. EIA's respondents to natural gas Form EIA-857 cannot report a revenue stream associated with the 80 percent for which they are transporting "for the account of others". To estimate the price of the natural gas consumed by the industrial sector, EIA has been exploring the use of another new survey (starting January 2002), Form EIA-423 [Monthly Cost and Quality of Fuels for Electric Plants] that surveys all nonutility electricity generating facilities with a nameplate capacity of 50 megawatts or greater. A subset of the EIA-423 respondents are in the industrial sector; we call them the "Not-22's," referring to their North American Industry Classification System code. At the April 2003 meeting we showed the committee some plots of the relationship between price and volume from the EIA-423 survey data. There was not a discernible relationship.

Meanwhile we have been receiving and reviewing additional EIA-423 data, which we believe represent off-system prices (the deliveries for the account of others) for industrial facilities that generate electricity (combined heat and power plants) and meet the threshold for the EIA-423 survey. Since the EIA-857 survey data represents the on-system prices, the question is how best to estimate the off-system prices for the industrial facilities that either don't generate electricity or generate electricity, but are not required file for Form EIA-423. Our most recent 2002 data show that natural gas volume in the on-system sale counted for 20% of total industrial sales, and the EIA-423 Not-22 respondents gave 12% of the total industrial sales that is part of off-system sales. This is a national level percentage, and varies from region to region.

To estimate the unaccounted for 68% of industrial sales, we have several options:

1. Use the average of available on-system and off-system sale prices.
2. Use the off-system sales price.
3. Use the most recent Manufacturing Energy Consumption Survey (MECS) data which is from 1998 and assume the relationship between the price of natural gas reported by manufacturers who generate electricity and those who don't generate electricity is appropriate to estimate off-system sales for the unaccounted for group.
4. Develop a model to estimate the price for the remaining off-system sales part.

MECS Data. The 1998 MECS data shown below indicate that the price that the manufacturers that generate electricity paid for natural gas was lower than the price paid by the non-generators. This may be because the non-generators are more likely to buy on-system (from their local utility) than the generators. To test this hypothesis we have requested from the Bureau of the Census a tabulation that separates the data by whether the respondent purchased natural gas on-system or off-system.

Region	Generate electricity (Yes/No)	No. of facilities	NG consumed (Mcf)	Cost ($)	Price ($)
Northeast	No	1876	424,868,627	1,634,621,841	3.85
	Yes	86	99,976,874	343,297,107	3.43
	Subtotal	1962	524,845,502	1,977,918,948	3.77
Midwest	No	3590	1,268,321,436	3,892,250,328	3.07
	Yes	211	441,129,092	1,221,579,743	2.77
	Subtotal	3801	1,709,450,528	5,113,830,071	2.99
South	No	3600	2,177,349,241	5,964,486,853	2.74
	Yes	265	1,594,038,474	3,786,434,753	2.38
	Subtotal	3865	3,771,387,715	9,750,921,606	2.59
West	No	1640	528,321,610	1,632,499,690	3.09
	Yes	110	283,463,892	760,646,139	2.68
	Subtotal	1750	811,785,502	2,393,145,829	2.95
US	No	10706	4,398,860,914	13,123,858,711	2.98
	Yes	672	2,418,608,332	6,111,957,742	2.53
	Total	11378	6,817,469,246	19,235,816,454	2.82

Developing a Model to Estimate the Price of Unaccounted for Off-system Sales

Another approach is to model the difference between natural gas prices paid by EIA-423 Not-22 respondents in 2002 (the first year of the survey's existence) and a day-weighted average of monthly Henry Hub (a large natural gas distribution hub in Southern Louisiana) prices. Six models were to be made, corresponding to the following areas: the Northeast Census Region, the Midwest Census Region, the South Census region excluding Louisiana, Texas and Oklahoma (which were found to be significantly different from the remainder of the region), Louisiana, Texas and Oklahoma as a block, the West Census Region excluding California, and California by itself following the same rationale used above. The state-level purchased price reported by EIA would be a weighted average of prices reported on surveys EIA-857, EIA-423 and the predicted price difference from the model added to the day-weighted monthly average of spot gas prices. An enhanced model is adopted to use a day-weighted average of monthly regional Henry Hub (Chicago, New York, California, Oregon and Louisiana) prices. There are some promising results in this modeling approach. (the attached write-up presents more information on this approach. Note: We're in the process of updating the runs and will have results shortly).

Other Investigations

In addition, we checked the correlation between these regional Henry Hub monthly prices and the natural gas prices for the Not-22 respondents; Northeast, South and Midwest regions showed strong correlation At the national level, there is a strong correlation between Henry Hub monthly price and those EIA-423 Not-22 respondents' prices. This confirms that the natural gas price in the manufacturing sector from Form EIA-423 follows the trend of the spot market price.

The subsequent task to improve the estimation of industrial natural gas price is to use the Manufacturing Energy Consumption Survey (MECS) 2002 data (available in Fall

2004) to validate the natural gas industrial price estimated by the difference of regional Henry Hub prices and EIA-423 respondents.

Questions for the Committee

We will be asking the committee for guidance in determining the tabulations we should request from MECS to validate our estimate of the industrial price and also for guidance on presenting our estimates. For example, we currently publish a table in the Natural Gas Monthly showing prices for end-users as well as other prices. http://www.eia.doe.gov/pub/oil_gas/natural_gas/data_publications/natural_gas_monthly/current/pdf/table_04.pdf

Does the Committee think we should add a column showing the price paid by industrial combined heat and power plants from the EIA-423 survey along with the percent of total industrial sales that it represents? Using data from another electric power survey, Form EIA-906, we can also present information on the proportion of natural gas consumed by industrial combined heat and power plants that the EIA-423 data represent.

What does the committee think of presenting a separate table that shows several estimates that attempt to represent a price for the entire industrial sector based on the 4 options we presented above?